

BRADYCELLUS Er.

B. rupestris Say.—N. C., II and V. E., V, 13. H., III and IV. Common under stones.

TACHYSCHELLUS Moraw.

T. atrimediis Say.—R., II, III and XI. H., IX, 13. C., XI, 6. Under stones; rather common.

T. badiipennis Hald.—R., II, IV, X, XI. N. C., IV. E., IV; not uncommon.

ANISODACTYLUS Dej.

A. rusticus Say.—R., III, 21. H., V, 5. Under stones, VII, 31 at arc lights. L., IV, 27.; common.

A. carbonarius Say.—H., VII, 13. N. M., X, 30; not common.

A. agricola Say.—C., X, 2; XI, 14 (Coll. by W. S. Fisher).

A. harrisii Lec.—H., V, 9.

A. nigerrimus Dej.—Common in all localities, II to V and IX, X, and XII.

A. melanopus Hald.—H., II, 12; IV, 22.

A. discoideus Dej.—Common everywhere, under stones and at arc lights. IV to VI and IX to XII.

A. baltimorensis Say.—R., II, III, IV and X under stones. H., XI and XII from dead logs in swamp; common.

A. verticalis Lec.—H., V, 22. One specimen.

A. terminatus Say.—H., VII, common at arc lights. N. M., X, 30 under stones.

A. nitidipennis Lec.—Common in all localities, II to VI and IX to XI under stones sometimes in small cell.

A. lugubris Dej.—H., II, 16. E., III, 27. R., III and IX, 23. Under stones.

A. interstitialis Say.—Common in all localities, II, IV, V, IX and XI.

On the Classification of the Lyttidae (Meloidae s. Cantharidae auctt.).

BY CREIGHTON WELLMAN.

As a result of some study of the Coleopterous family known as the Meloidae or Cantharidae I have decided upon a grouping of these insects which seems to me to express many of the natural characters of the family in so far as these can be shown in a linear table. In order that the final arrangement may be acceptable to the greater part of those scientists who work with the group, I am publishing the following outline of

my classification in the hope of receiving criticisms and suggestions which will help in perfecting it. I will be under great obligations to all entomologists who will write me their views both regarding the general idea and the detailed carrying out of it as laid down in this essay.

Before taking up the question of arrangement it should be said that the name which should be used to designate the blister beetles is Lyttidae. The reasons for this are evident. No one with material before him from all parts of the world can escape the conviction that the genus *Lytta* F. (*Cantharis* Aucct.), with its allies, is the typical one of the family and the one from which the student should start in his study of the phylogeny of the whole group. The family name Meloidae is entirely inappropriate, as the genus *Meloe* L. is nearly as atypical as any genus so far described. The long accepted family name Cantharidae already exists in the literature, and if we follow the International Code of Zoological Nomenclature* we should, on the substitution of *Lytta* F. for *Cantharis* Geoffr., regard Lyttidae as *ipse facto* becoming the proper designation of the family. Such terms as "Vesicants," etc., are to be considered as having no nomenclatorial status whatever. Thus we have:

Fam. Lyttidae,

Type Genus LYTTA Fabricius (1775).

Synn. Meloidae Aucct.

Cantharidae Aucct.

Various groups not belonging to the family have by various authors been included in it. One of these (*Cephaloon* Newm. and its allies) has been regarded until recently as being blister beetles, but an examination of the larva of *Cephaloon* shows that it has nothing to do with our family. In the case of the true Lyttidae the usual difficulties of classification are greatly enhanced by the wonderful effects of peculiar parasitic habits evinced in the hypermetamorphosis of the earlier stages no

*Art. 5. "The name of a family or sub-family is to be changed when the name of its type genus is changed."

less than in the remarkable degenerations and specializations of certain of the adults. We have widely differing opinions as to the value of some of the characters used in classification. Were it not for intermediate forms any systematist would put in different families an apterous *Meloe* with reduced, dehiscent, imbricate elytra and a *Nemognatha* with normal elytra, wings and maxillary lobes as long as its body. It cannot be too strongly emphasized that the forms from the western hemisphere must be largely taken into account in deciding upon a general classification of the entire family.

In presenting my own ideas on the grouping of the Lyttidae it will be well to recall briefly some of the attempts* which have already been made to provide a classification.

Linné (*Systema Naturae*, 1758) included the insects described by him and belonging to this family under his genus *Meloe*, and even in the last edition of the work mentioned he introduced no further sub-divisions of the group.

Geoffroy (*Histoire abrégée des Insectes*, 1761) adopted Linné's genus *Meloe*, restricting it to include only the wingless blister beetles with dehiscent elytra, and creating two new genera for the remaining species then known.

Latreille (*Caractères génériques des Insectes*, 1796; *Histoire naturelle des Crustacées et des Insectes*, 1804; *Considérations générales sur l'Ordre naturelle des Animaux*, 1809; *Règne animal de Cuvier*, 1817, also last edition, 1829, etc.) proposed several arrangements of the existing genera and added other genera. Latreille showed wonderful acumen in his work on the group and his writings are still of value. To the last he persisted in regarding *Horia* and *Cissites* as distinct from the other members of the family.

Leach (*Edinburgh Encyclopedia*, 1815) divided the blister beetles into three families, viz., 1. *Cerocomatidae* (*Cerocoma*, *Mylabris*), 2. *Meloidae* (*Oenas*, *Meloe*), 3. *Cantharidae* (*Cantharis*, *Zonitis*, *Nemognatha*, *Apalus*). This is the first at-

*An excellent resumé of these and other classifications, covering the period from 1758 to 1859, is to be found in Mulsant, *Histoire naturelle des Coléoptères de France, Vésicants*, pp. 14-27.

tempt to introduce sub-divisions into the group, and is of much historical interest.

Castelnau (*Histoire naturelle des Insectes Coléoptères*, 1840) also proposed three groups, but as follows: 1. Meloites (*Meloe*), 2. Mylabrites (*Cerocoma*, *Mylabris*, *Lydus*), 3. Cantharidites (*Ocnas*, *Cantharis*, *Lytta*, *Zonitis*, *Apalus*, *Sitaris*), 4. *Nemognatha*.

Redtenbacher (*Die Gattungen der Deutschen Käfer nach der analytischen Methode bearbeitet*, 1845) without adopting the names of any of the previously proposed subdivisions, devised the best systematic tables for the genera and species ever published up to his time.

Motschulsky (*Coléoptères recus d'un Voyage de M. Handschuh dans le midi de l'Espagne*, 1849) put forth three divisions of the family, viz.: 1. Obesicornes (*Mylabris*, *Dices*), 2. Lobaticornes (*Meloe*), 3. Gracilicornes (*Zonitis*, etc.).

Mulsant (*Histoire naturelle des Coléoptères de France*, 1857) attempted a detailed grouping of the family with the following result: I. Meloidiens (*Meloe*), II. Mylabriens (1. Cerocomaires, *Cerocoma*; 2. Mylabriaires, *Hycleus*, *Mylabris*); III. Cantharidiens (1. Cantharidiaires, a. Alosimates, *Alosimus*; b. Cantharidiates, *Cantharis*, *Epicauta* 2. Zonitaires, a. Zonitates, *Zonitis*, *Nemognatha*, *Apalus*; b. Sitarates, *Stenoria*, *Sitaris*).

Lacordaire (*Genera des Coléoptères*, 1865) proposed two subfamilies under the last of which he placed five tribes, thus: I. Meloides vrais (*Meloe*, *Cystodemus*, *Henous*); II. Cantharides (1. Horiides, *Horia*, *Cissites*, 2. Mylabrides, *Cerocoma*, *Mylabris*, 3. Cantharides vrais, *Eletica*, *Tetraonyx*, *Phodaga*, *Tegrodera*, *Cantharis*, *Spastica*, *Ocnas*, *Lydus*, *Sybaris*, *Cephaloon*, *Palaestra*, *Tmesidera*, *Zonidis*, *Apalus*, *Palaestrída*, 4. Sitarides, *Sitaris*, *Onychtenus*, *Sitarida*, 5. Nemognathides, *Nemognatha*, *Gnathium*). Lacordaire's work had a wide influence and his ideas have been followed by most entomologists since.

Le Conte (*Classification of the Coleoptera in the Smithsonian Miscellaneous Collection*, 1862) and LeConte and Horn

(Classification of the Coleoptera of North America, 1883) adopted a scheme similar to Lacordaire's which has colored the views of most American coleopterologists. In its final form it consisted of: I. Meloini (*Cystodemus*, *Megetra*, *Meloe*, *Henous*, *Porcospasta*), II. Cantharini (1. Horiini, *Horia*, *Tricrania*), 2. Nemognathini (*Nemognatha*, *Gnathium*, *Zonitis*), 3. Sitarini (*Hornia*, *Leonia*), 4. Mylabrini (*Cordylospasta*), 5. Cantharini genuini (a. Macrobases, *Macrobasis*, b. Cantharides, *Tetraonyx*, *Pleuropompha*, *Gnathospasta*, *Epicauta*, *Pyrota*, *Pomphopoea*, *Cantharis*, *Calospasta*, *Tegrodera*, c. Eupomphae, *Eupompha*, d. Phodagae, *Phodaga*).

Fairmaire (*Genere des Coléoptères d'Europe*, 1863) has arranged the family in this manner: I. Meloites, II. Cantharites, 1. Mylabrites (*Cerocoma*, *Coryna*, *Mylabris*), 2. Cantharites propres (*Oenas*, *Lydus*, *Cabalia*, *Lytta*, *Lagorina*, *Cantharis*), 3. Sitarites (*Stenodera*, *Hapalus*, *Sitaris*, *Ctenopus*), 4. Zonitites (*Zonitis*, *Nemognatha*, *Leptopalpus*).

Geminger and Harold (*Catalogus Coleopterorum*, 1870) employed no subdivisions whatever in their arrangement of the family. They accepted forty-two of the genera which had been proposed, disposed in the following order: *Meloe*, *Nomaspis*, *Pseudomeloe*, *Cysteodemus*, *Henous*, *Gynaptyryx*, *Horia*, *Tricrania*, *Apteropasta*, *Cissites*, *Rhampholyssa*, *Cerocoma*, *Diaphorocera*, *Coryna*, *Mylabris*, *Iletica*, *Tetraonyx*, *Jodema*, *Phodaga*, *Calospasta*, *Tegrodera*, *Eupompha*, *Cantharis*, *Spastica*, *Oenas*, *Lydus*, *Halosimus*, *Sybaris*, *Cephaloon*, *Palaestra*, *Tmesidera*, *Zonitis*, *Hapalus*, *Palaestrída*, *Sitaris*, *Sitarida*, *Onychtenus*, *Goetymes*, *Ctenopus*, *Nemognatha*, *Gnathium*.

Beauregard (*Les Insectes Vésicants*, 1890) arrived at the following classification: 1. Zonitites (*Nemognatha*, *Gnathium*, *Zonitoides*, *Zonitis*, *Stenodera*, *Hapalus*, *Leptopalpus*), 2. Sitarites (*Ctenopus*, *Onychtenus*, *Stenoria*, *Sitaris*, *Sitarida*, *Goetymes*, *Sitarobrachys*, *Hornia*, *Leonia*), 3. Meloites (*Meloe*, *Pseudomeloe*, *Porcospasta*, *Megetra*, *Cysteodemus*, *Nomaspis*, *Gynaptyryx*), 4. Cantharites, a. Horiides (*Horia*, *Cissites*, *Tricrania*), b. Cantharides (*Tetraonyx*, *Spastica*, *Cantharis*), 5. Lyttites (*Henous*, *Apterospasta*, *Macrobasis*, *Epicauta*, *Pyrota*,

Iletica, Calospasta, Iselma, Phodaga, Eupompha), 6. Mylabrites (*Lydus, Alosimus, Oenas, Mylabris, Cerocoma, Cephaloon, Sybaris, Rampholyssa, Diaphorocera, Cordylospasta*). Beaugard's work is epoch-making, more from its method and influence than from its actual conclusions however. He was the first to base divisions on larval as well as adult characters and, while his interpretations are not so important as his data, his monograph is a foundation stone of a natural classification.

Champion (*Biologia Centrali-Americana*, 1893) adopted the following groups: 1. Meloinae (*Meloe, Henous, Cysteodemus, Megetra*), 2. Cantharinae, a. Horniides (*Leonia*), b. Horiides (*Horia*), c. Nemognathides (*Nemognatha, Gnathium, Zonitis*), d. Cantharides (*Tetraonyx, Eupompha, Calospasta, Macrobasia, Gnathospasta, Epicauta, Pyrota, Cantharis*).

Escherich (*Bestimmungs-Tabelle der europäischen Coleopteren*, 1897) proposed the following grouping: 1. Meloidae (s. str.), a. Meloini, b. Lyttini, 2. Zonitidae, a. Cephaloonini, b. Zonitini. Escherich deserves the credit of being the first to see that the family falls naturally into two great divisions, one of which is typified by the genus *Zonitis*.

Von Heyden, Reitter and Weise (*Catalogus Coleopterorum Europae, etc.*, 1906) put forth the following: 1. Meloini (*Meloe, Proscarabaeus, Sitarobrachys*), 2. Lyttini (sic)* (*Cerocoma, Rampholyssa, Zonabris (Hycleus), Oenas, Calydyus, Lydus (Halosimus)*), 3. Lyttini (*Lytta (Teratolytta), Lagorina, Cabalia, Epicauta, Zonitis, Euzonitis, Cochliophorus, Stenodera, Nemognatha, Leptopalpus, Hapalpus (Criolus), (Stenoria), Sitaris, Ctenopus*).

Ganglbaur (*Verh. zool.-bot. Gesellsch. Wien*, 1907) modified Escherich's (1897) idea as follows: 1. Meloinae, a. Lyttini (*Epiacuta, Lytta, Lagorina, Cabalia, Lydus, Calydyus, Oenas, Mylabris, Cerocoma, Rampholyssa*), b. Meloini (*Meloe, Sitarobrachys*), 2. Zonitinae (*Hapalus, Stenoria, Sitaris, Ctenopus, Stenodera, Cochliophorus, Leptopalpus, Zonitis, Nemognatha*).

Before presenting my own classification which lays stress upon phylogeny, as against pure taxonomy, for a guiding

*Probably a *lapsus calami* for Zonabrini.

principle, it may be well to remark on some of the crucial genera upon which turn the groupings adopted. It will be seen that I regard some genera formerly considered to be closely allied as widely separate, and *vice versa*. The chief character relied on by Lacordaire and his followers in dividing the family into two unequal groups is the length of the metasternum, which in *Meloe* et al. is very short, allowing the middle coxae to overlap the hind coxae. This is entirely an artificial character in this connection and is of course due to atrophic changes following on the loss of the insect's wings in the course of evolution. Occasional absence of wings in a family is not so important a character in the Coleoptera as has been supposed. This is well illustrated in the Carabidae. In that family I have even had brought to my notice by Dr. Walther Horn of Berlin a single apterous specimen of a usually winged species (*Calosoma reticulatum*).* The weakness of the received classification of the blister beetles is well illustrated by such forms as *Henous* (an apterous *Lytta*), *Apterospasta* (an apterous *Macrobasis*) and especially by the insect known as *Calospasta opaca* G. H. Horn, which I have tried to fit in Fairmaire and Germain's genus *Gynapteryx*, but for which I now propose a new genus, viz.:

GYNAECOMELOË Wellm. gen. nov.

♂ with general form as in *Tetraonyx* Latr. and some species of *Calospasta* Lec. Elytra as long or longer than the body, provided with wings, metasternum long, mesocoxae not overlapping hind coxae.

♀ with general form as in *Meloe* L., elytra much shorter (often less than half) than the body, apterous, metasternum short, mesocoxae overlapping hind coxae.

Claws and other characters as in *Calospasta* Lec.

*Since this was written, Dr. E. C. Van Dyke has called my attention to other equally interesting instances of wing degeneration in the genus *Calosoma* from the Galapagos Islands, among the Scarabaeidae from the same region and especially in the Family Tenebrionidae, from the Pacific Coast region.

Type species *Calospasta opaca* G. H. Horn.

This genus cannot be confused with any other. From *Gynapteryx* Fairm. et Germ. (which is a *Henous* with winged ♂ ♂) it can easily be told by its unequal claws and short elytra of the ♀.

Other apterous forms occur in various divisions of the family, such as *Hornia* and *Leonidia* (Sitarini) and *Tricrania* (Horiini), but should not have too much stress laid on them from the standpoint of general classification, although the presence or absence of wings among the Lyttidae is usually a good generic character.

Taking up now in order some of the genera helpful in deciding on a scheme of classification I may say that *Sybaris* should probably be regarded as related to the *Mylabris* group, although its claws have the superior division pectinate. This relation can be traced through *Alosimus*, *Lydus* and *Oenas* to *Mylabris*. The mouth parts of *Oenas* and *Alosimus* are very like *Mylabris* (the mandibles being dissimilar, i. e., the right and left mandible different), *Lydus* being a little farther removed in this respect. *Cordylospasta* is to be considered as also rather near *Mylabris*, although its generalized features are not so like as its appearance suggests, and the antennal and other common characters may possibly be due simply to parallel development. Its claws, etc., place *Cordylospasta* near *Cysteodemus*, *Megetra* and the *Calospasta* group of genera. The larval no less than the adult characters of the *Cerocoma* and *Mylabris* groups place them close together. *Elctica*, while having some points in common with the Mylabrines, is by virtue of its having mouth parts like *Pyrota* (i. e., with all the parts differentiated and isolable) is a link between the group last mentioned and the Lyttines.

The gradations in the *Lytta* division (through the series of genera allied to *Calospasta*) toward the Meloinae are gradual and evident. The genera *Henous*, *Gynapteryx*, *Gynaecomeloc*, etc., have already been mentioned in this connection.

Between the *Meloc* forms and the *Sitaris* tribe the break is on the whole greatest and it is here that I propose to divide

the genera composing the family into two divisions. Still there are not wanting suggestions of relation, such apterous genera as *Hornia* and *Sitarobrachys* (with short metasterna and overlapping coxae) distinctly recalling Meloine forms.

From the genera last mentioned with their allies we come without great gaps through the Sitarine group to the Zonitines, such genera as *Onychtenus* and *Stenodera* furnishing the passage.

In the *Zonitis* group I should mention *Deridea* and probably *Isclma*, remarkable on account of their non-pectinate claws. The other genera here are close together, *Palaestra* for instance being only a *Zonitis*-mimicry of a *Lycus*, and *Nemognatha* a *Zonitis* with specially developed mouth parts. Gradations of both these last forms occur.

The mouth parts, episterna and claws all unite to connect the Zonitines with the *Horia* group, although the absence of vesicating properties and other features make these last rather distinct.

The peculiar little group of species now included under the genus *Tricrania* Lec. is of great significance in any classification of the family. In some of their features recalling the Sitarini, they are obviously allied to *Horia* and *Zonitis*. The claws of *Tricrania sanguinipennis* are those of a *Cissites*, while those of *stansburii* strongly suggest *Zonitis*. A new genus is required for the proper expression of the relation which these insects hold to the groups mentioned, namely,

TRICRANIODES Wellm. gen. nov.

Allied to *Tricrania* Lec., from which it differs by the claws being simply pectinate with longish regular teeth instead of a double row of short tubercles, and also by the body being winged (it is apterous in *sanguinipennis* Say., the first described species of the group, and which may now be regarded as the type of *Tricrania* Lec. s. str.)

Other characters as in *Tricrania* Lec.

Type species *Tricrania stansburii* Hald.

The genus is easily distinguished from *Tricrania* by the absence of wings in the latter.

These two allied genera are to be regarded as connecting the Horiines (through the *Zonitis* group) with the rest of the Lyttidae.

To sum up in a word what has been said regarding the various genera, the family Lyttidae contains two chief and fairly homogenous divisions which are related to each other principally through the *Sitaris* and *Meloe* groups of genera.

On the ground of the foregoing and many other considerations I am dividing the blister beetles into two sub-families which I separate as follows:

Fam. **LYTTIDAE** (Cantharidae s. Meloidae Auctt.)

- A. Pseudochrysalis not confined in exuvia of preceding larval instar, ♂ genitalia disposed vertically or obliquely in abdomen **Lyttinae** nov.
 AA. Pseudochrysalis confined in exuvia of preceding larval instar, ♂ genitalia disposed horizontally in abdomen,
Zonitinae Ganglb.

Under these sub-families six tribes should be recognized as follows:

Subfam. **Lyttinae** nov.

- A. Wings present, elytra normal.
 a. Antennae usually clavate, mandibles often dissimilar,
Mylabrini nov.
 aa. Antennae never clavate, mandibles similar.....**Lyttini** Lec.
 AA. Wings absent at least in ♀, elytra usually dehiscent, sometimes imbricate**Meloini** Esch. s. str.

Subfam. **Zonitinae** Ganglb.

- A. Labrum distinct.
 a. Elytra reduced or dehiscent, maxillary lobes normal,
Sitarini nov.
 aa. Elytra normal, maxillary lobes sometimes greatly produced,
Zonitini Esch. s. str.
 AA. Labrum small, sometimes hardly visible.....**Horiini** Lec.

In conclusion I give my grouping of the genera known to me, which is as yet tentative in some parts, and on which I especially invite criticisms and suggestions.

Fam. LYTTIDAE.

Subfam. LYTTINAE.

Trib. **Mylabrini**Group *Sybarides*.*Sybaris*.*Lydomorphus, Lydus, Alosimus, Oenas, (Paroenas).*Group *Cordylospastides*.*Cordylospasta*.Group *Cerocomides*.*Rampholyssa, Cerocoma, Diaphorocera*.Group *Mylabrides*.*(Lydoceras, Ceroctis), Mylabris, (Decapotoma, Coryna, Actenodia).*Group *Eleticides*.*Eletica*.Trib. **Lyttini**.Group *Lyttides*.*Pyrota, Epicauta, (Macrobasis, Causima), Lytta, (Teratolytta, Lagorina, Cabalia), Pleuropomph, Gnathospasta, Lyttonyx, Spastica, Tetraonyx.*Group *Calospastides*.*Phodaga, Negalius, Eupompha, Tegrodera, Pleuropasta, Calospasta.*Trib. **Meloini**.Group *Gynaecomelodides*.*Gynaecomeloc*.Group *Cysteodemides*.*Cysteodemus, Megetra*.Group *Apterospastides*.*Poreospasta, Apterospasta, Gynapteryx, Henous.*Group *Meloides*.*Melœ, Meloëtyphlus.*

Subfam. ZONITINAE.

Trib. **Sitarini**.Group *Horniides*.*Hornia, Leonidia, Sitarobrachys, Sitarida.*Group *Sitarides*.*Sitaromorpha, Glasnucia, Sitaris, Stenoria, Ctenopus, Onyctenus.*

Trib. **Zonitini**Group *Derideides*.*Deridea*, *Iselma*.Group *Zonitides*.*Stenodera*, *Palaeustra*, (*Tmesidera*), *Cochliophorus*, *Zonitis*, (*Euzonitis*), *Zonitoides*.Group *Nemognathides*.*Gnathium*, *Nemognatha*, *Leptopalpus*.Trib. **Horiini**Group *Tricraniides*.*Tricraniodes*, *Tricrania*.Group *Horiides*.*Cissites*, (*Synhoria*), *Horia*.

The Genus *Copestylum*.

By J. M. ALDRICH, Moscow, Idaho.

The genus under consideration belongs to the dipterous family Syrphidæ, and is closely related to *Volucella*, an immense assemblage of mostly rather large flies having a Southern range. The only generic character which sets off *Copestylum* is the structure of the arista, which is covered, especially above and toward the apex below, with closely set, short, black, flattened hairs, giving it under the microscope a little the appearance of a black ostrich plume. In *Volucella* the arista is of ordinary structure, more or less plumose with the usual long, thin, tapering hairs.

The first member of this genus to become known to science was *marginatum*, described as a *Volucella* by Say (a). His material was from Mexico, and from the wording must have consisted of a single specimen of each sex.

Macquart (b) described the genus and founded it upon the species *flaviventris*, from Colombia. He mentions two females.

Osten Sacken (c) recognized Say's species (as a *Volucella*) from Waco, Texas, in a single specimen; in (d) he correctly places *marginatum* under the genus *Copestylum*, and suggests that *flaviventris* may be a synonym.

Williston (e) puts Macquart's species as a synonym of *mar-*